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EXAMINER	
WONG, LUT	

ART UNIT	PAPER NUMBER
2129	

NOTIFICATION DATE	DELIVERY MODE
06/17/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/734,459	KIRSHENBAUM, EVAN	
	Examiner	Art Unit	
	LUT WONG	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 31-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10, 31-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action is responsive to an AMENDMENT entered 4-23-2009 for the patent application 10/734459.

The Office Action of 1-23-2009 is fully incorporated into this Final Office Action by reference.

Status of Claims

Claims 1-10, 31-39 are pending. Claims 1, 3, 6 have been amended. Claims 31-39 are newly added.

Claim Objections

Claim is objected as improper multiple dependent claim. See MPEP § 608.01(n), under the heading "B. Unacceptable Multiple Dependent Claim Wording," and subheading "2. Claim Does Not Refer to a Preceding Claim," second example. A proper multiple dependent claim depends only from preceding claims.

In instant case, claim 6 is depend on claim 8, which is not a preceding claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 3, 31 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 3 has been amended to recite "and wherein the credibility rating is based on the performance measures of the candidate solution operating on each of the one or more training cases not including the particular training case." There is no support for such limitation. Applicant did not recite where support can be found in the spec for the amended limitation. Applicant should specifically point out the support for any amendments made to the disclosure. See MPEP 2163.06 and 714.02.

Newly added claim 31 is rejected for the same reason.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-10, 31-39 are rejected under 35 U.S.C. 102(b) as being anticipated by **Paris** et al (Applying Boosting Techniques to Genetic Programming" Jan 2002)

In general, applicant's inventive concept is combination of evolutionary strategy with boosting. Paris teaches such concept and names it GPboost.

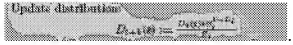
Claim 1. (Previously Presented) Paris anticipates a processor-based method for determining difficulty measures for training cases used in developing a solution to a problem, comprising:

providing a set of training cases (See e.g. Table 5 on *learning set*. See also section 4.3 on learning set) having respectively associated difficulty measures (EN: "difficulty measure" not further defined, reads on *weight* of a sample. See e.g. Table 5 on *weight* of an example. See also section 4.3 on Distribution D1, D2, D3 for each samples. See also section 2.2 that badly classified example have a higher weight in the next round. As such, higher weight = higher difficulty);

operating a candidate solution (See e.g. Table 5 on $f(x_i)$) on a particular training case (EN: "candidate solution" not further defined, reads on $f(x_i)$, which is a "function" or "hypothesis" of a particular training case).

determining a performance measure (See e.g. Table 5 on $|f(x_i) - y_i|$) of the candidate solution operating on the particular training case (EN: $|f(x_i) - y_i|$ is a measure of error between the target output y_i and the output of the candidate solution $f(x_i)$);

determining a credibility rating ("credibility rating" not further defined, reads on loss for each example: $L_i = \frac{|f(x_i) - y_i|}{\max_{j=1,\ldots,N} |f(x_j) - y_j|}$) of the candidate solution, the credibility rating indicating a degree to which the performance measure is "representative" of the difficulty measure of the particular training case (EN: again, "credibility rating" not further defined. The Examiner interprets a loss of 0 means the candidate solution is doing better job than a loss of 1, thus more credible); and

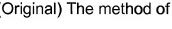
modifying the difficulty measure of the particular training case based on the performance measure of the candidate solution operating on the particular training case and the credibility rating of the candidate solution (See e.g. section 4.2. on 

. EN: the distribution (i.e. difficulty measure of case) of next round is based on the loss (which, in turn, is based on the performance measure and the credibility rating of the solution)).

Claim 2. (Original) The method of claim 1, wherein determining the credibility rating comprises:

selecting one or more training cases from the set of training cases based on the difficulty measures of the one or more training cases (*EN: merely repeating the process.* See e.g. section 4.2 on

);

determining performance measures of the candidate solution operating on each of the one or more training cases (*EN: merely repeating the process.* See e.g. section 4.2 on 

); and

computing the credibility rating based on the performance measures of the candidate solution operating on each of the one or more training cases *(EN: merely repeating the process.*

).

Claim 3. (currently amended) The method of claim 2, wherein the one or more training cases does not include the particular training case, and wherein the credibility

rating is based on the performance measures of the candidate solution operating on each of the one or more training cases not including the particular training case (See e.g. section 4.1 where it teaches the probability of an example to be picked up is proportional to its weight. That means some cases will not be picked, which means the credibility rating will not include such particular training cases).

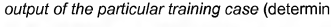
Claim 4. (Original) The method of claim 1, wherein providing the set of training cases having respectively associated difficulty measures comprises initializing a difficulty measure of each training case in the set of training cases to a predetermined value (See e.g. section 4.2 on $\text{Initialize } D_1(i) = 1/m \text{ for all } (x_i, y_i) \in S$).

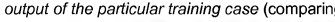
Claim 5. (Original) The method of claim 4, wherein the predetermined value is a maximum value (See e.g. section 4.2 on $\text{Initialize } D_1(i) = 1/m \text{ for all } (x_i, y_i) \in S$. EN: 1/m reads on "maximum" value. In particular, 1/m is the normalized "maximum value").

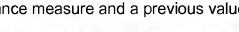
Claim 6 (currently amended) The method of claim 8, wherein:

providing the set of training cases comprises *associating each training case in the set of training cases with a target output* (case label. See e.g. section 4.2 that each case has a target classification (i.e. +1 or -1 label). See also section 2.2.);

operating the candidate solution on the particular training case comprises *obtaining an output from the candidate solution operating on the particular training case* (See e.g. section 4.2 on ); and

determining the performance measure of the candidate solution operating on the particular training cases comprises *comparing the candidate solution output to a target output of the particular training case* (determining loss. See e.g. section 4.2 on ).

Claim 7. (Original) The method of claim 6, wherein comparing the candidate solution output to the target output of the particular training case comprises *calculating a value corresponding to a deviation between the candidate solution output and the target output of the particular training case* (comparing calculated class with label. See e.g. section 4.2. on ).

Claim 8. The method of claim 1, wherein modifying the difficulty measure of the particular training case comprises modifying the difficulty measure based on a weighted average of the performance measure and a previous value of the difficulty measure (See e.g. section 4.2 on ).

Claim 9. The method of claim 8, wherein a weight of the weighted average is based on the credibility rating and a base learning rate (See e.g. section 4.2. on ).

Claim 10. (Original) The method of claim 1, wherein modifying the difficulty measure comprises maintaining the difficulty measure within a predetermined interval (See e.g. section 4.2 that the weight of each training example are "maintained" with a predetermined interval (for exactly 1 rounds)).

Claim 31 (New) The method of claim 8, wherein the performance measure of the candidate solution operating on the particular training case is computed without including training cases in the set other than the particular training case (See e.g. section 4.1 where it teaches the probability of an example to be picked up is proportional to its weight. That means some cases will not be picked, which means the performance measure will not include such particular training cases).

Claims 32-39 are drawn to a system of claims 1-10, and are rejected for the same reason.

Response to Arguments

Applicant's arguments filed 4-23-2009 have been fully considered but they are not persuasive.

In re pg. 6, applicant argues

> Claim 1 has been amended to more specifically tie the claim to a processor. The amendment has not been made in response to the § 102 rejection. Support for the amendment

In response, applicant's intend (to appeal) is acknowledged.

In re pg. 6, applicant argues

> It is respectfully submitted that claim 1 is clearly not anticipated by Paris.
>
> As a preliminary note, it is respectfully submitted that the characterization in the Office Action that "applicant's inventive concept is combination of evolutionary strategy with boosting" appears to be a characterization based on the teachings of the cited reference Paris, and not based on the express words of the claim itself. Claim 1 should be construed according to the express language in the claim, not based on language that appears in a cited reference.

In response, the Examiner disagrees.

1) The Examiner does not see how claim 1 is **clearly** not anticipated by Paris. Such argument is merely a conclusory statement without explaining why and/or how Paris fails to teach claim 1.

2) The Examiner did not characterize the invention based on language appearing in the cited reference. Rather, it is based on an understanding after reading both the reference and the specification. It is suggested the applicant re-read [0015] of pgpub html version where it states

> "[0015] In accordance with embodiments of the invention, **the selection** of training cases presented to the candidate models **is biased** toward selecting training cases that are more difficult for the candidates of the population to solve. **Biasing the selection** of the training cases takes into account the premise that **evolutionary computation** produces models that become proficient at solving the training cases presented. However, there is a distribution for how well a candidate solves the training cases. In other words, a candidate model may perform well if presented with some training cases and less well if

> presented with other training cases. Biasing the selection of the training cases towards selection of more difficult training cases enhances the development of solutions that are proficient at solving more difficult problems. Candidate solutions that are able to solve the more difficult training cases proficiently may be better able to generalize and produce more accurate results when presented with a real (non-training) problem."

It should be clear that applicant's own specification concedes the invention is based on the concept of adaboost and evolutionary computation (which includes genetic algorithms).

3) The concept of Adaboost can be found in Paris reference. Further readings about Adaboost can be found in "A Short Introduction to Boosting" cited in prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

In re pg. 6, applicant argues

> It is clear that Paris does not provide any teaching of the claimed subject matter.
>
> Claim 1 recites providing a set of training cases having respectively associated difficulty measures. The Office Action argued that § 4.2 of Paris discloses such a set of training cases

In response, the Examiner disagrees.

1) The Examiner does not see how Paris does not provide **any** teachings of the claimed subject matter. Again, such argument is merely a conclusive statement.

In re pg. 7, applicant argues

> learning set S. The Office Action does not specifically point out what in § 4.2 of Paris constitutes the "difficulty measures" referred to in claim 1. However, it appears that with respect

In response, as set forth in the rejection above, the *weight* of an example is the "difficulty measure".

In re pg. 7, applicant argues

> updating of the distribution D_{t+1} as constituting "modifying the difficulty measure." Therefore, it appears that the Office Action is equating the distribution $D_{(i)}$ as being the "difficulty measures" recited in claim 1.

In response, as set forth in the rejection above, it is the *weight* of an example (i.e. the value of *D(i)*) being the "difficulty measure".

In re pg. 7, applicant argues

> Applicant does not make any concession that such a distribution $D_{(i)}$ can be considered the difficulty measures of claim 1. Applicant does not need to reach that issue because Paris clearly does not provide any teaching of other elements of claim 1.

In response, the Examiner disagrees. Again, such argument is merely a conclusive statement.

In re pg. 7, applicant argues

> The Office Action argued that updating the distribution D_{t+1} based on a previous distribution D_t, as disclosed in § 4.2 of Paris, constitutes "modifying the difficulty measure of the particular training case" recited in claim 1. Updating the distribution D_{t+1} is based on the previous version of D_t and the parameter β_t as well as a normalization factor Z_t. The parameter β_t is calculated based on the average loss of all examples in the learning set S, as explained in § 4.2

In response, the Examiner disagrees. The updates of distribution are not based on parameter B as argued. Rather, it is based on distribution and the lost (which in turns depends on the performance measure and credibility ratings as set forth in the rejection above).

In re pg. 7, applicant argues

> of Paris. Paris states that the parameter β_i is the confidence given to function f_i for run t. However, there is absolutely no indication that updating the distribution $D_{t,i}$ in Paris is "based on the performance measure of the candidate solution operating on the particular training case and the credibility rating of the candidate solution." Leaving aside whether or not the parameter

In response, the Examiner disagrees. As explained above, the updates of distribution are not based on parameter B as argued. Rather, it is based on distribution and the lost (which in turns depends on the performance measure and credibility ratings as set forth in the rejection above).

In re pg. 7, applicant argues

> and the credibility rating of the candidate solution." Leaving aside whether or not the parameter β_i in Paris is the same as the "credibility rating" of claim 1, Paris still fails to disclose that updating its distribution is based on the performance measure of the candidate solution operating on the particular training case. The Office Action had argued that the "performance measure" of claim 1 is equivalent to the fitness function *fit*. However, there is not indication that the updating of the distribution D_{t+1} is based on this fitness function.

In response, the Examiner disagrees. As made clear in the rejection above, the "performance measure" is equivalent to the [redacted] part of the fitness function.

In re pg. 7, applicant argues

> It is also noted that the fitness function *fit* of Paris is calculated based on all examples in its learning set S. Therefore, the fitness function of Paris is not a performance measure of the candidate solution operating as the **particular** training case. Note also that the parameter D_{t+1} in

In response, the Examiner disagrees. As made clear in the rejection above, the "performance measure" is the [redacted] of the **particular** training case.

In re pg. 7, applicant argues

> candidate solution operating as the **particular** training case. Note also that the parameter D_{t+1} in Paris is computed based on β_t, which is based on average loss of all examples of the learning set

In response, the Examiner disagrees. As explained above, the updates of distribution are not based on parameter B as argued. Rather, it is based on distribution and the lost (which in turns depends on the performance measure and credibility ratings as set forth in the rejection above).

In re pg. 7, applicant argues

> S; therefore, even if it is to be argued that β_t is considered the performance measure (which it clearly is not), updating D_{t+1} based on β_t is not updating D_{t+1} based on the performance measure of the candidate solution operating on the **particular** training case.

In response, the Examiner disagrees. As explained above, the updates of distribution are not based on parameter B as argued. Rather, it is based on distribution

and the lost (which in turns depends on the performance measure and credibility ratings on the **particular** training case as set forth in the rejection above).

Examiner Note

In the event that the applicant is willing to amend, further define "credibility rating" to receive favorable consideration. In particular, the Examiner suggests incorporating equation [1] in pg. 7 of the spec into claim 1.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Freund et al "A Short Introduction to Boosting" teaches boosting and adaboost.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lut Wong whose telephone number is (571) 270-1123. The examiner can normally be reached on M-F 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vincent David can be reached on (571) 272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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/David R Vincent/
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